CLEMSON COOPERATIVE EXTENSION

Entomology
Insect Information Series

Providing Leadership in Environmental Entomology

Department of Entomology, Soils, and Plant Sciences • 114 Long Hall • Clemson, SC 29634-0315 • Phone: 864-656-3111

Hemlock Woolly Adelgid

The hemlock woolly adelgid (HWA) (Fig. 1) is a small (1/32 inch), reddish purple, aphid-like insect that covers itself with a white fluffy secretion. In the United States, HWA is a destructive pest of both eastern and Carolina hemlock. Hemlocks native to Asia, and both western and mountain hemlock, native to the western US, appear to have tolerance to HWA feeding. This insect pest was accidentally introduced to America from Asia. It was first reported in the Pacific Northwest in the mid-1920s, and in the eastern US in the mid-1950's. In the eastern US it has spread throughout the Appalachians from New England south to South Carolina and Georgia and west into Kentucky.

Fig. 1. Hemlock Woolly Adelgid (HWA)

HWA has two generations each year. When eggs deposited in early summer hatch, the crawlers (immature stage) locate a feeding site, attach their mouthparts at the base of a needle, and immediately enter a resting state (aestivation). In mid-fall, these individuals become active and begin feeding, reaching the adult stage in mid-winter. This adult generation consists only of females which produce eggs asexually (without mating) from late winter through spring. Upon hatching, this generation of crawlers immediately begin to feed and become adults in late spring. This generation has both asexual and sexual adults. Asexual, wingless females remain on hemlock and produce the eggs that hatch in early summer. Sexual adults consist of winged males and females that fly to spruce where they mate and produce eggs. In the US, there are no suitable spruce species and these individuals die without producing any eggs.

Fig. 2. HWA nymphs are black with white waxy fringes.

Fig. 3. White waxy material covers the HWA on the hemlock branches.

When they first hatch, crawlers are reddish-brown and actively seek feeding sites. While active, crawlers are easily dispersed by wind, birds, wildlife, and people. Once a crawler locates a feeding site, it inserts the piercing-sucking mouthparts at the base of a hemlock needle. At this point they turn dark with a white fringe (Fig. 2) and begin to secrete the white fluffy "wool" that will completely cover their body. Infested branches become covered with this white material (Fig. 3). On hemlock, wingless females (Fig. 1) complete their development within the wool mass in which they will eventually lay their eggs. Eggs are orange/brown and hidden within the protective wooly covering.

HWA feeding causes needles to turn yellow and drop from the tree. This is followed within 2 years of infestation by branch dieback and a thinning crown. Mature trees can die in 4 to 10 years depending on the level of HWA infestation, tree size, level of environmental stress, and quality of the growing site.

HWA are difficult to control because the wool protects them from traditional pesticide applications. Both insecticidal soaps and horticultural oils can be effective if applied when crawlers are actively moving about before they produce their wool coverings. These also have minimal impact on predators. Horticultural oils can be applied during winter and before new growth emerges in the spring, however, oil sprays can damage hemlock during the growing season. Registered pesticides containing imidacloprid or dinotefuran have been shown to be effective when trees are actively taking up water from the soil. The most effective application methods are as soil drenches or soil injections within the root zone. For trees located close to water sources, trunk injections can be used. Trunk injection methods are only available through specially trained arborist and landscape professionals. ALWAYS READ THE LABEL CAREFULLY BEFORE USE OF ANY PESTICIDE.

Two predatory beetles, *Sasajiscymnus tsugae* and *Laricobius nigrinus*, are being mass produced and released into HWA infested hemlock forests by the HWA Biological Control Program at Clemson University. In addition, the US Forest Service is examining both *Scymnus sinuanodulus* and *S. ningshanensis* for their potential as additional predators of HWA. These beetles feed exclusively on HWA. Although they will not prevent or eradicate an HWA infestation, they are good management tools. The use of chemical controls can maintain specimen trees, or entire stands until *S. tsugae* and *L. nigrinus* become established or until more effective biological control agents are discovered and introduced.

Other resources:
http://na.fs.fed.us/fhp/hwa/index.shtm
http://entweb.clemson.edu/cuentres/eiis/pdfs/bb8.pdf

Prepared by Hugh Conway, Research Entomologist, and Joseph D. Culin, Department Chair & Professor, Department of Entomology, Soils, and Plant Sciences, and Roy Hedden, Forest Entomologist/ Professor, Department of Forestry and Natural Resources, Clemson University.

EIIS/NI-4 (New 09/2004) Revised 07/2007; Revised 5/2011.